Hepatitis B and C Viruses: Prevalence and co-factors among patients with liver cirrhosis

Said Rahatullah Haidari

Abstract  Liver cirrhosis is the final pathway of multiple chronic liver diseases and is a pathological entity defined as diffuse hepatic fibrosis and regenerative nodule formation. The objective of this study was to investigate the prevalence and co-factors of hepatitis B and C viruses among patients with liver cirrhosis. A total of 79 patients were registered from 2018 to 2022. The prevalence of liver cirrhosis in 2018, 2019, and 2020. 2021 and 2022 were 21.7%, 13.0%, 19.1%, 6.1% and 8.7%, respectively. The incidence of cirrhosis was significantly ($P=0.01$) greater in rural areas than in urban areas. In addition, according to age, the incidence of cirrhosis was significantly ($P=0.001$) greater in those >52 years old than in those 18-40 and 41-52 years old. Moreover, the incidence of cirrhosis was greater in females than in males, but the difference was not significant. Without that, the causes of cirrhosis for HBV, HCV and Non-B and Non-C patients were 13% and 40%, 15.7%, respectively. The results showed that causes of cirrhosis were significantly associated with HCV incidence, and the prevalence of underweight, normal, overweight, and obese individuals was 13%, 15.7%, 26.1% and 18.9%, respectively. Prevalence according to BMI categories did significantly differ among the categories. Furthermore, the incidences of diabetes mellitus for patients with HBV and HCV and for non-B and non-C individuals were 21.7%, 47% and 31.3%, respectively, but the incidence of diabetes mellitus was significantly associated with the incidence of HCV. In addition, the incidences of encephalopathy for HBV, HCV and non-B and non-C patients were 20.9%, 47.8%, and 31.3%, respectively, and for Ascites, they were 24.3%, 44.3%, and 31.4%, respectively. Finally, the incidence of cirrhosis was significantly ($P=0.001$) greater in smoking patients than in nonsmokers.

Keywords: co-factors, hepatitis B and C viruses, liver cirrhosis, prevalence

1. Introduction

Liver cirrhosis is the final pathway of multiple chronic liver diseases and is a pathological entity defined as the formation of diffuse hepatic fibrosis and regenerative nodule formation (Feldman et al., 2020). Cirrhosis is the result of liver cell damage and has a prevalence of 0.27%. An estimated 1.5 billion people worldwide suffer from chronic liver disease, and 2.4 million people die from liver disease (Papadakis et al., 2019). Etiologies included chronic viral hepatitis, alcohol use, drugs, autoimmune liver disease, and metabolic liver disease. Genetic predisposition may also play a role; obesity is also a risk factor (Papadakis et al., 2019). Increased coffee and tea consumption and statin use are linked to a decreased risk of cirrhosis (Papadakis et al., 2019).

HBV is a DNA virus that belongs to the family Hepadnaviridae (Feldman et al., 2020). An estimated 260 million people worldwide are infected with chronic HBV (Organization, 2019b). Most of these people do not experience complications; however, 15% to 40% develop serious sequelae such as liver cirrhosis or HCC. Chronic HBV infection results in more than 887,000 deaths globally each year (Organization, 2019b). The number of HBV-related deaths from cirrhosis and liver cancer increased 33% from 1990 to 2013 (Stanaway et al., 2016). Effective HBV vaccines have been available since the early 1980s, but perinatal and early life exposures continue to become major sources of infection in many developing countries because of the inability to implement a policy of universal vaccination of newborns due to limited resources. Vague sexual contact and IV drug abusers account for most new cases of hepatitis B among adults in low-endemic areas (Organization, 2016). HBV infection rates vary significantly across regions worldwide. In highly endemic areas such as Southeast Asia (excluding Japan), China and most of Africa, 6% or more of the population is chronic HBV carriers (Organization, 2019a).

More than 71 million people worldwide are chronically infected with HCV (Blach et al., 2017; Mendizabal et al., 2019). Unfortunately, HCV successfully evades the host immune response in 50% to 90% of acutely infected people, thereby leading to chronic infection in the majority of cases. The natural history of hepatitis C varies greatly; the reasons for this heterogeneity remain incompletely understood but are related to viral, host, and environmental factors. HCV is a single-
stranded positive-sense RNA virus that belongs to the Flaviviridae family and has been classified as the sole member of the genus Hepacivirus (Robertson et al., 1998).

Studies also report that diabetes mellitus and obesity are linked to liver disease and more severe fibrosis in CHC patients than in HCs (Hourigan et al., 1999; Taura et al., 2006). The mechanisms underlying the worsening of clinical outcomes in patients with liver cirrhosis due to diabetes are not well defined. First, DM accelerates liver fibrosis and inflammation, leading to more severe liver failure. Second, DM may increase the rate of bacterial infections in patients with liver cirrhosis, which is associated with an increased mortality rate (Cheruvattath & Balan, 2007; Garcia-Tsao, 2005).

A 2009 study of 1.3 million British women revealed that women who smoked were three times more likely to develop cirrhosis than women who did not smoke (Liu et al., 2009). Various chemicals in tobacco smoke can cause liver fibrosis through different mechanisms, including possible activation of stellate cells through nicotinic acetylcholine receptors (Soeda et al., 2012). Nicotine induces fibrogenic changes in the human liver via nicotinic acetylcholine receptors expressed on hepatic stellate cells (Chakinala et al., 2022). Moreover, it increases the production of proinflammatory cytokines (Arnson et al., 2010). One additional possible mechanism may be increased secondary iron overload due to polycythemia, which leads to oxidative stress in hepatocytes as well as hepatic necroinflammation, apoptosis, and excessive iron deposition in the liver (Fleming & Ponka, 2012).

Obesity, as for the risk of cirrhosis. The results of the large prospective study “Million Women Study” performed in the United Kingdom showed that more than a million women without known liver disease were included and that approximately 17% of incident cases of cirrhosis can be directly attributed to obesity (Liu et al., 2010). The objective of this study was to investigate the prevalence and co-factors of hepatitis B and C viruses among patients with liver cirrhosis.

2. Materials and Methods

2.1. Research Design

A total of 79 patients were registered at a private hospital in Jalalabad city from 2018 to 2022. The data used in this study were obtained from an analytical cross-sectional study conducted at a private hospital in Jalalabad city, Nangarhar Province, Afghanistan. Participants aged > 18 years who had a health check-up in the hospital from 2018 to 2022. The health check-up data included demographic characteristics; HCV and HBV test results; and medical history information. The contents of the questionnaire included information on demographic and socioeconomic factors (including age, sex, body weight, diabetes status, BMI, etc.) and self-reported medical history.

2.2. Statistical Analysis

SPSS software version 23.0 was used for all the statistical analyses. The categorical data are expressed as frequencies and percentages. Chi-square tests for trend were used to analyze the associations between study variables and liver cirrhosis incidence. Only variables with $P = 0.05$ were considered to be significantly associated with liver cirrhosis.

3. Results

The prevalence of liver cirrhosis in 2018, 2019, and 2020. 2021 and 2022 were 21.7%, 13.0%, 19.1%, 6.1% and 8.7%, respectively. The incidence of cirrhosis was greater in 2018 and 2020 than in other years (Figure 1A). The incidence of cirrhosis was significantly ($P = 0.01$) greater in rural areas than in urban areas (Figure 1B). In addition, according to age, the incidence of cirrhosis was significantly ($P = 0.001$) greater in those >52 years old than in those 18-40 and 41-52 years old (Figure 1D). Moreover, the incidence of cirrhosis was greater in females than in males (Figure 1C).

3.1. Causes and co-factor prevalence of liver cirrhosis

The causes of cirrhosis for HBV, HCV and Non-B and Non-C patients were 13% and 40%, 15.7%, respectively. The results showed that the cause of cirrhosis was significantly associated with the incidence of HCV, as shown in Figure 2B. Additionally, the prevalence of underweight, normal, overweight, and obese individuals was 13% (15.7%), (26.1%) and (18.9%), respectively. Prevalence according to BMI categories did significantly differ among all categories, as indicated in Figure 2A. Moreover, the incidences of diabetes mellitus for HBV, HCV and Non-B and Non-C individuals were 21.7%, 47%, and 31.3%, respectively, and the incidence of diabetes mellitus was significantly greater for HCV than for HBV and non-B and non-C individuals (Figure 2C). Finally, the incidence of cirrhosis was significantly ($P = 0.001$) greater in smoking patients than in nonsmokers, as shown in Figure 2D.

3.2. Prevalence of liver cirrhosis complications according to cause

The prevalence of encephalopathy for patients with HBV or HCV infection and for non-B and non-C patients was 20.9%, 47.8% and 31.3%, respectively. In addition, the incidences of Ascites for HBV, HCV and Non-B and Non-C were 21.7%,
47% and 31.3%, respectively, and the incidences of encephalopathy and ascites were significantly greater for HCV than for HBV and non-B and non-C, as shown in Figure 3.

Figure 1 A: Five-year incidence, B: Residence area, C: Sex and D: Age.

Figure 2 Co-factor prevalence of liver cirrhosis. A: BMI, B: Cause of cirrhosis, C: Diabetes mellitus, D: Smoking. The results revealed that the incidence of cirrhosis was greater in smokers, HCV patients, overweight patients and obese patients.
Figure 3 Prevalence of encephalopathy and ascites. The results showed that encephalopathy and ascites were more common in patients with hepatitis C than in patients with hepatitis B and in patients without hepatitis B and C.

4. Discussion

Our results showed that causes of cirrhosis were significantly more strongly associated with HCV than with HBV, Non-B or Non-C. Similarly, Grewal et al. reported that HBV and HCV are the major causes of chronic liver disease (CLD) at the time of the study and that HCV was more common than HBV was (Grewal et al., 2018). Researchers have indicated that smoking is associated with the development and progression of liver disease (Martí-Aguado et al., 2022); moreover, other researchers have reported that cigarette smoking has important negative effects on a multitude of liver diseases and that smoking cessation must be prioritized (Rutledge & Asgharpour, 2020). Similarly, with respect to the above studies, our results indicated that the incidence of liver cirrhosis is greater in smokers than in nonsmokers and that cigarette smoking is significantly associated with liver cirrhosis.

There is growing evidence that obesity, diabetes mellitus type 2 (DM), and metabolic syndrome (MeS) are associated with nonalcoholic fatty liver disease (NAFLD) (Masuoka & Chalasani, 2013). Moreover, the association between diabetes and advanced liver disease may have important clinical implications, particularly in morbidly obese patients, and insulin resistance might play an important role in fibrogenesis and carcinogenesis in the liver (Fabbrini et al., 2010). Similarly, the present study reported that the prevalence of underweight, normal, overweight, and obese individuals was 13%, 15.7%, 26.1% and 18.9%, respectively, as did the prevalence according to BMI category. Moreover, the incidences of diabetes mellitus for HBV, HCV and Non-B and Non-C individuals were 21.7%, 47% and 31.3%, respectively, and diabetes mellitus was significantly associated with liver cirrhosis.

5. Conclusions

The incidence of cirrhosis was significantly greater in patients with HCV infection, old age, and obesity. Additionally, cirrhosis cases were more common among smokers and in rural areas than among urban and nonsmoking areas. Further research in this area could provide valuable insights into the prevention, management, and treatment of liver cirrhosis and its associated risk factors.

Ethical considerations

We conducted this research in strict accordance with ethical principles in medical research. The research protocol received approval from the Research Committee of the Medical Faculty. The data were collected directly from the authentic medical records stored in the hospital. Throughout the research process, we maintained a commitment to honesty and professionalism. We ensured the utmost confidentiality of all patients’ private information.

Conflict of interest

The authors declare no conflicts of interest.

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References


